IN THE SPECIFICATION:

Please amend paragraph number **[0006]** as follows:

[0006] Conventional probe cards can be generally classified into two categories: ~~needle-type~~ needle-type probe cards and membrane-type probe cards. Needle-type probe cards are the most common type of probe card and include elongated probe needles mounted on an annular ring. A typical probe needle is a pointed needle-like element of small size, with a tip that tapers down into a sharp point. When mounted on the annular ring, the probe needles typically have their free ends pointing downward and are carefully aligned with the ends of all the other probe needles to be in a single plane. An exemplary probe needle configuration is disclosed in United States Patent 5,532,613 to Nagasawa et al., which includes a probe needle having a pointed or conical tip. Probe needles are typically made of tungsten, but materials such as beryllium copper, palladium, and rhenium tungsten are also used.

Please amend paragraph number **[0012]** as follows:

[0012] The delivery of excessive voltage during probe testing to an IC may also result in damage to the probe card. In Japanese Patent Application 61174771, a small fuse is provided on the ~~backside~~ back side surface of a probe card in order to prevent the end of a probe needle connected to a grounding pad from seizing due to an overcurrent delivered to a short-circuited IC. Japanese Patent Application 0115367 discloses a thermal fuse fixed between a probe needle and power source which generates heat and becomes fused before a probe pin generates heat and is fused. Each of these patent applications, however, is drawn to means for preventing seizing and fusing of a probe needle routed to ground and power and does not address the limitation of current through the probe card in general or through any probe needle which might otherwise cause that probe needle to become nonfunctional.

Please amend paragraph number **[0016]** as follows:

[0016] A method of fabricating a probe card is also provided. The method comprises providing a probe card substrate; providing a plurality of conductive traces over a surface of ~~said~~

the probe card substrate; providing a plurality of probe elements in electrical communication with the plurality of conductive traces wherein at least one of the probe elements is configured for supplying a test signal to at least one semiconductor die and wherein a second probe element is configured for receiving a test signal from the at least one semiconductor die; and providing at least one repairable or replaceable component in electrical communication with at least some of ~~said~~ the plurality of conductive traces.

Please amend paragraph number **[0031]** as follows:

[0031] As used herein, use of the term "IC testing" encompasses both ~~"static" testing (where~~ static testing, where the IC is simply powered ~~up) and "dynamic" testing (where~~ up, and dynamic testing, where the IC is powered up and is sent signals exercising some degree of functionality over the ~~IC).~~ IC.

Please amend paragraph number **[0032]** as follows:

[0032] Referring to drawing FIG. 1, an exemplary probe card 30 configured in accordance with an embodiment of the present invention is shown in a schematic view. As described in more detail herein, probe card 30 acts as an interface to an IC testing computer which produces appropriate test signals and senses the response of the ICs under test. The probe card 30 includes a substrate 32, typically a PCB substrate, preferably formed of a rigid or ~~semi-rigid~~ semi-rigid material adapted to withstand the stresses associated with IC testing. Materials preferred for use in fabricating substrate 32 include FR-4 and other glass-filled and ceramic resins, silicon (including monocrystalline silicon, silicon-on-glass, silicon-on-sapphire), germanium, gallium arsenide, or other materials that are well-known in the art. In one aspect of the embodiment, substrate 32 may be formed so as to have a coefficient of thermal expansion matching, or closely matching, the ICs to be tested.

Please amend paragraph number **[0035]** as follows:

[0035] By use of the term "in electrical communication~~ with"~~ with," it is meant that the subject electrical components are configured and positioned so as to complete an electrical circuit between one another when the components are supplied with power. Thus, components in electrical communication with one another will carry an electrical current originating from the same source when the probe card 30 is operational.

Please amend paragraph number **[0036]** as follows:

[0036] As shown in FIG. 1, test contacts 36 are preferably disposed on a periphery of substrate 32 for electrical interconnection with external testing equipment (not shown). The illustrated arrangement of test contacts 36, however, is not intended to be limiting of the present invention, and test contacts 36 may alternatively be disposed on one or both sides of substrate 32 and/or in a range of various locations, including locations in the area of a centermost portion of substrate 32. Conductive traces 34, which are in electrical communication with test contacts 36, thus provide electrical paths for test circuitry to probe elements 38. Conductive traces 34 are preferably formed of a highly conductive, low~~ resisitivity~~ resistivity metal, such as aluminum, copper, titanium, tantalum, molybdenum, or alloys of any thereof. Conductive traces 34 may be fabricated according to conventional methods well known in the art, including, but not limited to, plating, thin film deposition processes (e.g., CVD, sputtering, photolithography processes and etching), and thick film processes (e.g., stenciling or screen printing).

Please amend paragraph number **[0052]** as follows:

[0052] Passive fuses 42*a* may be formed and/or repaired by conventional methods well known in the art, such as conductive layer deposition techniques, photopatterning processes, and etching techniques. As previously discussed, passive fuses 42*a* may be formed concurrently with the deposition of other conductive structures on probe card 30 (e.g., conductive traces 34, test contacts 36, bond pads for probe elements, etc.), or passive fuses 42*a* may be deposited or placed on probe card 30 in a separate processing step. The~~ "neck"~~ neck portion 48 of a passive

fuse 42*a* may be configured of varying widths dependent upon the nature of the application for which it will be used and the materials used in its construction. In a preferred aspect of the invention, a passive fuse 42*a* is configured with a neck portion 48 formed of a material selected from the group consisting of titanium tungsten, aluminum, copper, nichrome, doped polysilicon, platinum silicide, and alloys or combinations of any thereof. Further preferably, the neck portion 48 is configured of a width ranging from about 0.3 micron to about 10.0 microns.

Please amend paragraph number **[0053]** as follows:

[0053] A second preferred passive fuse configuration is shown in drawing FIG. 3. Here, a passive fuse 42*b* is configured, in part, as a cutout of a bond pad 54, wherein the bond pad 54 may be a test contact 36 or a bonding interface for a conductive trace 34 and a probe element (not shown). In this embodiment, passive fuse 42*b* forms a conductive fuse-type link between bond pad 54 and a conductive trace 34 and is thus also referred to herein as a "linking fuse" 42*b*. As can be seen in FIG. 3, linking fuse 42*b* is relatively narrower in width than conductive trace 34 such that linking fuse 42*b* will trip in the manner previously described upon the application of an overcurrent into it. Linking fuse 42*b* may be fabricated using a variety of techniques which typically involve deposition and photopatterning as previously described. A dielectric layer 45 is disposed under conductive trace 34 and passive fuse 42*b*.

Please amend paragraph number **[0056]** as follows:

[0056] In a related embodiment, a passive fuse 42*d* configured as a dual-in-line socket is shown in drawing FIG. 4B. Passive fuse 42*d* comprises pin portions 68, 70 with an insulated connector shell 72 at one end thereof. Pin portions 68, 70 are formed of a conductive material and are in electrical communication with a fuse conductor 74 residing within connector shell 72. Similar to the embodiment shown in FIG. 4A, through-hole portions 56 of substrate 32 are configured with inner contacts 58 and positioned so as to provide an electrical "open" in conductive trace 34. When passive fuse 42*d* is pressed into through-hole portions 56 and the electrical circuit is completed wherein current can travel from one end portion of a conductive

trace 34 to a first inner contact 58, to a first pin portion 60, to fuse conductor 74, to a second pin portion 60, to a second inner contact 58, and through to a second end portion of the conductive trace 34. A current which is sufficiently high to trip passive fuse 42*d* will thus disable the circuit. To restore the circuit, the blown passive fuse 42*d* is removed, and a new passive fuse 42*d* may simply be pressed into ~~through holes~~ through-hole portions 56.

Please amend paragraph number **[0057]** as follows:

[0057] With regard to passive fuses 42*c* and 42*d*, one of skill in the art will readily ascertain that the pin portions of these fuses are adaptable for use with conductive ~~traces~~ traces 34 that are in intermediate layers in substrate 32. In this regard, the pin portions of passive fuses 42*c* and 42*d* may, for example, extend downwardly through ~~through holes~~ through-hole portions 56 in substrate 32 to contact conductive pads in electrical communication with a conductive ~~trace~~ trace 34 in an intermediate layer, thus completing a circuit through the trace.

Please amend paragraph number **[0058]** as follows:

[0058] Furthermore, passive fuses 42*c* and 42*d* are but two examples of discrete electrical components that may be used as protective fuses for purposes of the present invention. It will be readily apparent to one skilled in the art that various other conventional designs for discrete electrical components may be readily utilized herein. By use of the term "discrete electrical ~~component"~~ component," it is meant that the particular electrical component is manufactured separately from the probe card 30 and thus subsequently attached thereto or otherwise integrated therein.

Please amend paragraph number **[0063]** as follows:

[0063] A series of embodiments of an active fuse on a probe ~~card is~~ card are shown in drawing FIGs. 6A, 6B, 6C and 6D. Therein, the active fuse comprises a Polymer Positive Temperature Coefficient (PPTC) fuse as an overcurrent protection mechanism interposed in, or

located adjacent to, a conductive trace 34 on a probe card 30. Like components of each of FIGs. 6A, 6B, 6C and 6D are referenced by the same reference characters.

Please amend paragraph number **[0064]** as follows:

[0064] Various lead arrangements for PPTC fuses are shown in FIGs. 6A, 6C and 6D. In FIG. 6A, a PPTC active fuse 82*a* is shown having a radial lead arrangement positioned in a through-hole portion 56 of substrate 32 and in electrical communication with inner contacts 58. In FIG. 6B, the PPTC active fuse 82*a* of FIG. 6A is shown in tripped condition. A PPTC active fuse 82*b* having an axial lead arrangement with terminals 84, 86 in electrical communication with conductive trace 34 is shown in FIG. 6C. A PPTC active fuse 82*c* in a surface mount configuration known in the art is shown in FIG. 6D. Fuses 82*b* and 82*c* may be electrically connected to conductive traces 34 in a manner well known in the art, to include the use of conventional soldering techniques.

Please amend paragraph number **[0065]** as follows:

[0065] Generally, the PPTC active fuses 82*a*, 82*b* and 82*c* for use in the present invention are constructed with highly conductive carbon particles 88 combined with a nonconductive polymer 90 that exhibits two phases. In a first phase, which occurs under a predetermined current threshold, the polymer 90 exhibits a crystalline or ~~semicrystalline~~ semi-crystalline structure in which the molecules form long chains and are arranged in a regular structure (FIG. 6A). In this phase, the carbon particles 88 are packed within the crystalline polymer structure, thus forming a conductive chain spanning between opposing electrodes of the PPTC fuse 82*a*.

Please amend paragraph number **[0066]** as follows:

[0066] When electricity is conducted through the crystalline structure, which has a low resistance configuration, the temperature increases within the PPTC fuse. At a predetermined temperature which is correlated with a current overload, this structure transitions by expanding to

an amorphous phase which breaks the chain of ~~conductive~~ carbon particles 88. The resulting random alignment of carbon particles 88 caused by the phase change instantly opens the circuit (FIG. 6B).

Please amend paragraph number **[0077]** as follows:

[0077] Those skilled in the art will also understand that various combinations or modifications of the preferred embodiments could be made without departing from the scope of the invention. For example, those ~~skill~~ skilled in the art will appreciate that a plurality of the fuses described herein may be interposed side by side in a conductive trace of a probe card.

Please amend paragraph number **[0079]** as follows:

[0079] In drawing FIG. 8, protective fuses 138 are illustrated as forming a portion of pogo pins 140. Pogo pins 140 enable a probe card 136 to be electrically connected with test equipment (not shown). Thus, pogo pins 140, including ~~interposed~~ protective fuses 138, are electrically connected to conductive traces 144 on probe card 136 via test contacts 142 residing on a probe card surface. Test signals are transmitted from the test equipment to probe card 136 by way of pogo pins 140 and protective fuses 138. ~~Fuses~~ Protective fuses 138 are configured to prevent excessive currents from being transmitted to probe card 136, thus preventing damage to probe card 136. ~~Fuses~~ Protective fuses 138 further prevent excessive currents from traveling through probe needles 146 to one or more IC devices 148 under ~~test 148.~~ test. In a preferred aspect of the embodiment, protective fuses 138 which have been tripped due to excessive current may be replaced by, for example, inserting a new protective fuse 138 into a pogo pin 140 in the aspect of the embodiment where a pogo pin 140 is configured, in part, as a fuse body.